REMARKS/ARGUMENTS

Favorable reconsideration of the present application is respectfully requested.

Claim 1 has been amended to recite that the corrosion-proof member extends over less than half of the circumference of the suction passage or bypass passage. Basis for this is evident from Figures 3 and 6-9. Claim 1 has also been amended to clarify that the corrosion-proof member is circumferentially positioned to face the returning flow of oil. Basis for this was present in the original Claim 1, and is shown in Figure 11.

Claim 8 has been amended to recite that the balancing cavity is closed such that any returning oil entering the balancing cavity from the delivery passage can exit the balancing cavity in a reverse direction from the direction of entering the balancing cavity. Basis for this is evident from Figures 11 and 12.

The present invention is directed to an oil pump having a bypass passage whereby excessive oil from a delivery passage can be bypassed to the suction passage as a returning flow of oil by way of the bypass passage and a flow control valve therein, when the flow amount of oil in the delivery passage is excessive. A problem that can arise in such an oil pump is that the high pressure returning oil can corrode the inner wall of the bypass passage and/or suction passage, particularly if the oil pump casing is made of a lightweight material such as aluminum. It has therefore been known to provide a cylindrical shell of corrosion resistant material, as shown in Japanese Unexamined Utility Model publication 2-139386 (see page 2 of the present specification). In a similar fashion, U.S. patent 5,782,615 (Noah et al.) discloses a tubular passage liner 112 which is provided in an inlet passage 104 of the pump to protect the housing against erosion from the high pressure bypassed fluid. As is best seen in Figures 4-7 of Noah et al., the tubular liner is cylindrical, except for a narrow slit 180, and is angled to have a length corresponding to the passage within which it is to be positioned.

A problem with the cylindrical shell body of JP '386 or the near cylindrical tubular passage liner 112 of Noah et al., is that the cylindrical or near cylindrical shape thereof reduces the passage diameter and creates a flow restriction for the returning fluid. It also requires a relatively large amount of heavy, hard metal, which is detrimental to applications in which light weight is preferred.

It is an object of the present invention to provide an oil pump which can reduce the required amount of corrosion resistance material and which can minimize the flow restriction necessitated by corrosion resistant maerial (page 3, lines 8-13). The feature of Claim 1 is based upon the recognition that the flow control valve will cause the high pressure returning oil to disproportionately strike the inner wall of the bypass passage or suction passage at one circumferential portion in preference to another. This is illustrated, for example, in Figure 10 which illustrates an example in which the flow control valve 70 causes the oil from the delivery passage 28 to flow in the direction K1, thereby creating erosion primarily in the circumferential side of the bypass passage 29 which is struck by this flow. Therefore, in accordance with a feature of the invention, the corrosion-proof member 9 extends over less than half of the circumference of the passage (the bypass passage 29 in Figure 11), and is located at a circumferential position to face the returning flow of oil. In this case, the corrosion-proof member is not provided at circumferential positions where corrosion is less problematic, and so less corrosion-proof material need be used. The weight and flow restriction are thereby reduced.

Claims 1-7 were rejected under 35 U.S.C. §103 as being obvious over the "admitted prior art" (APA) in view of Noah et al. In this case, it was the position of the Office Action that the gap 180 in the circumferential extent of the tubular passage liner 112 of Noah et al. comprises the claimed discontinuity, and that it would have been obvious in view of Noah et al. to pave provided such a "corrosion-proof member" in the conventional oil pump such as

that of JP '386. It is nonetheless respectfully submitted that the amended claims clearly define over this prior art.

While the Office Action correctly notes that the tubular passage liner 112 has a gap or discontinuity 180, this gap or discontinuity has a small circumferential extent and is limited to a size required to permit compression of the tubular passage liner 112 so that it can be inserted into the passage (column 6, lines 7-28). There is no teaching or recognition that the gap should be greater in size.

Thus, to the extent that Noah et al. would suggest a modification of the APA (i.e., JP '386), Noah et al. might suggest providing a small gap in the circumference of an otherwise tubular liner, the gap being of such a size as to permit the liner to be introduced into the passage to be protected against corrosion. However, since neither JP '386 nor Noah et al. teaches that the corrosion-proof member should be limited in circumferential extent to a circumferential position to face the returning flow of oil, or that the returning flow of oil is in any way disproportionately introduced at one circumferential portion of the passage, no combination of the above references would suggest modifying the APA (JP '386) such that the tubular liner therein is reduced to a corrosion-proof member which extends over less than half of the circumference of the passage and is circumferential positioned to face the returning flow of oil. It is therefore respectfully submitted that amended Claim 1 and its dependent claims define over this prior art.

Claims 8-12 are directed to a feature of the invention wherein a second corrosion-proof member is provided in a balancing cavity into which a part of the returning oil flows from the delivery passage for increasing the balance of the spool. For example, referring again to Figures 10 and 11, the fluid flow K5 in the balancing cavity 110 balances the flow K1 which flows directly into the bypass passage 29.

Claims 8-12 were rejected under 35 U.S.C. §103 as being obvious over the APA and Noah et al., and further in view of U.S. patent 4,575,314 (Teubler et al.), which was cited to teach an "erosion-proof insert 51" in a balancing concavity. Amended Claim 8 is nonetheless believed to define over this prior art.

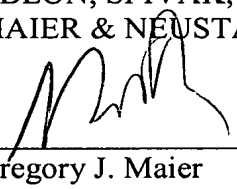
As explained above, the second corrosion-proof member is provided in a balancing cavity into which a part of the returning flow of oil flows from the delivery passage for increasing balance of the spool. As such, the balancing cavity is provided for balance, and not as a flow passage. Therefore, the fluid flow K5 entering the balancing concavity 110 can exit by reversing direction. This creates the potential for erosion at region 112 which faces the returning flow of oil. According to the claimed invention, the second corrosion-proof member is provided at a position for facing a part of the returning flow of oil. Moreover, in order to more clearly recite this feature, Claim 8 now further recites that the balancing cavity is closed such that any returning oil entering the balancing cavity from the delivery passage can exit the balancing cavity in a reverse direction from the direction of entering the balancing cavity.

In contrast, the "erosion-proof insert" 51 of Teubler et al. is not provided in a balancing concavity of the type recited in the claims. Instead, Teubler et al. discloses that the insert 51 is provided in the passage 18 having an elbow and which comprises a feed passage. It is not a balancing concavity which is closed such that returning oil entering therein can exit by reversing direction. Thus, the presence of the insert 51 in the *feed* cavity of Teubler et al. would not suggest providing a corrosion-proof member in a balancing concavity which is closed as now recited in Claim 8. It is therefore respectfully submitted that the amended claims define over any combination of the above references.

Applicants therefore believe that the present application is in a condition for allowance and respectfully solicit an early notice of allowability.

Respectfully submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



Gregory J. Maier
Attorney of Record
Registration No. 25,599

Robert T. Pous
Registration No. 29,099

Customer Number
22850

Tel: (703) 413-3000
Fax: (703) 413 -2220
(OSMMN 03/06)
RTP/rac
I:\ATTY\RTP\262637US-AM.DOC